UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/537,180	12/30/2005	Shunsuke Sunahara	CSP-116-A	8016

21828 7590 02/24/2010

CARRIER BLACKMAN AND ASSOCIATES
43440 WEST TEN MILE ROAD
EATON CENTER
NOVI, MI 48375

EXAMINER	
MEHTA, MEGHA S	

ART UNIT	PAPER NUMBER
1793	

NOTIFICATION DATE	DELIVERY MODE
02/24/2010	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

cbalaw@gmail.com
cbalaw@ameritech.net
wblackman@ameritech.net

Office Action Summary	Application No.	Applicant(s)	
	10/537,180	SUNAHARA ET AL.	
	Examiner	Art Unit	
	MEGHA MEHTA	1793	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *29 October 2009*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-9 and 32-36* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-9 and 32-36* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Status Identifiers

1. Please note that ALL claims must be listed in each version of the amendments, including cancelled claims. For example, the current amendment should include the line:

10-31. (Cancelled)

Claim Objections

2. Claim 1 is objected to because of the following informalities: Line 10 reads "the joining direction at opposite end…." This should read "ends". Appropriate correction is required.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claim 7 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 5 requires the ends to be joined on the same metal workpiece, but claim 7 requires them to be on different workpieces. For purposes of examination, the end faces referred to in claim 7 will be on the same workpiece to be consistent with claim 5.

5. Claim 1 recites the limitation "said first and second protrusions" in line 17. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are

such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1, 2 and 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 5,794,835 Colligan et al in view of US 2,148,714 Urschel further in view of US 2,740,877 Knauth et al.

Regarding claim 1, Colligan teaches a method of manufacturing a body comprising the steps of the plate material having fingers **12**, **14** projecting from corners along the joining direction, and pairs of said fingers prom protrusions projecting along the joining direction at opposite ends of the shape (figure 3), friction stir welding abutting regions of the end faces of the plate material to join the end faces to each other, thereby forming a body having said protrusions and removing said protrusions (column 8, lines 19-27), wherein said end faces of the plate material are friction-stir welded such that said abutting region is devoid of a formation of swellings (column 4, lines 57-60).

Colligan does not teach forming a hollow cylindrical body by bending the plate material. Urschel teaches a method of joining two metal sheets or two ends of a single metal sheet to form a tube including bending a plate material **44** to have a substantially hollow cylindrical shape with end faces of the plate material opposing each other along a joining direction, bringing the end faces of the plate material into abutment against each other along the joining direction (figure 7). It would have been obvious to one of ordinary skill in the art to include the bending step of Urschel in the method of Colligan because bending a metal sheet to form a tube is a common method of creating tubes and pipes.

Colligan does not explicitly teach gripping the protrusions by a gripping member. Knauth teaches butt welding metallic members (two sheet members or two pipes) including gripping

edges by a gripping mechanism **17** such that the edges are maintained in abutment along said joining direction during welding (column 1, line 66 – column 2, line 7 and column 6, lines 14-18). Knauth does not explicitly teach gripping fingers of protrusions. However, the Examiner is importing only the gripping mechanism **17** of Knauth into the method of Colligan. Therefore, in the method of Colligan in view of Knauth, the gripping mechanism would be gripping the protrusions or any other part of the workpieces that needed stabilization during the welding process. It would have been obvious to one of ordinary skill in the art to include the grippers of Knauth in the method of Colligan because the gripping fingers ensure that the workpieces remain stationary and aligned during welding. Additionally, it would have been obvious to grip the protrusions of Colligan with the grippers because this would minimize interference with the weld tool during the welding process.

Regarding claim 2, Colligan in view of Knauth and Urschel teaches a hollow cylindrical body having said protrusions that is pressed from a side of an outer circumferential wall surface thereof when the abutting regions are friction stir welded (Colligan column 3, lines 48-59), where the body being welded is secured during the welding operation, and thus being pressed from the outer circumferential wall.

Regarding claim 35, Knauth teaches that the step of gripping said protrusions includes only gripping said protrusions by said gripping mechanism (column 3, lines 41 -57). Please note that including the word "only" does not exclude other functions that may be performed by the gripping mechanism or gripping the protrusions by other elements of the apparatus.

3. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over US 5,794,835 Colligan et al in view of US 2,148,714 Urschel further in view of US 2,740,877 Knauth et al as applied to claim 1 above, and further in view of US 2002/0020164 Cleveland et al.

Regarding claim 3, Colligan in view of Knauth and Urschel teaches manufacturing the hollow body. None of Colligan, Knauth or Urschel teaches inclining the body while welding. Cleveland teaches a method of friction stir welding hollow cylindrical bodies while said hollow cylindrical body **102** is inclined with respect to a horizontal direction (paragraphs [0026] and [0027]). Figure 8-1 shows an inclined hollow cylindrical body. It would have been obvious to one of ordinary skill in the art at the time of the invention to include the inclination of Cleveland in the method of Colligan, Urschel and Knauth because workpieces with varying thicknesses would have to be inclined with respect to a horizontal direction in order to obtain a strong, uniform weld.

4. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over US 5,794,835 Colligan et al in view of US 2,148,714 Urschel further in view of US 2,740,877 Knauth et al as applied to claim 1 above, and further in view of WO 99/33594 Lawrence.

Colligan teaches friction stir welding, Urschel teaches bending a sheet to form a tube and Knauth teaches using grippers. None of Colligan, Urschel or Knauth teaches forming a wheel rim. Lawrence teaches friction stir welding a wheel rim that is joined to a wheel disk to produce a vehicular wheel manufactured as said hollow cylindrical body (abstract). Lawrence does not explicitly teach the wheel disk. However, in order to be used in a vehicle, the wheel rim must have a disk. It would have been obvious to one of ordinary skill in the art at the time of the

invention to include a wheel rim of Lawrence in the process of Colligan, Urschel and Knauth because a wider variety of final products allows for a wider variety of possible applications.

5. Claim 32 is rejected under 35 U.S.C. 103(a) as being unpatentable over US 5,794,835 Colligan et al in view of US 2,148,714 Urschel further in view of US 2,740,877 Knauth et al as applied to claim 1 above, and further in view of US 6,325,273 Boon et al.

Regarding claim 32, Colligan in view of Knauth and Urschel teaches that the step of friction stir welding comprises a method step of plunging the plunging member into end faces of the plate material thereof along the abutment therebetween with a workpiece plunging member having a substantially circular cross section (figure 5C). None of Colligan, Urschel or Knauth teaches the displacement of the plunging member. Boon teaches a method of friction stir welding metal workpieces wherein the step of said friction stir welding involves use of a friction stir welding tool having a probe **1** on a tip end thereof, said probe is plunged into portions of the plate material around said end faces thereof and moved in the joining direction along the abutment between the end faces (figure 1), said probe having a substantially circular cross section, and said probe is displaced from a boundary line between said end faces in a circumferential direction of said hollow cylindrical body by a predetermined distance (figure 3), where probe protrusion **2** is displaced from the boundary line.

None of Colligan, Urschel, Knauth or Boon teaches the exact displacement amount. However, it would have been obvious to one of ordinary skill in the art at the time of the invention to determine the optimum degree displacement for the probe because a larger displacement creates a wider weld, which generally creates a stronger bond (column 5, lines 45-47). "[W]here the general conditions of a claim are disclosed in the prior art, it is not inventive to

discover the optimum or workable ranges by routine experimentation," (MPEP 2144.05 Section II).

6. Claims 8, 9 and 34 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 2,148,714 Urschel in view of US 5,794,835 Colligan et al.

Regarding claim 8, Urschel teaches a welding process for joining first and second ends of a metal workpiece together, comprising bending the metal workpiece to have a curved shape, bringing a first end face and a second end face respectively on the first and second ends of the metal workpiece **44** having the curved shape into abutment against each other to form abutting regions, and then welding the abutting regions to join said end faces to each other, wherein said first end face and said second end face have burrs projecting in a thickness direction of said metal workpiece, and sags extending in a direction transverse to said thickness direction (figure 7), when said abutting regions are formed, said sags of said first end face and said second end face are disposed in confronting relation to each other and positioned outwardly of an outer circumferential surface of said curved shape, and said burrs are positioned inwardly of an inner circumferential surface of said curved shape, wherein said outer circumferential surface is longer than the inner circumferential surface and wherein the abutting regions are welded (page 1, column 2 line 58 – page 2, column 1, line 6 and figure 7). The outer surface and the inner surface are measured to the end of the plates, that is, the ends of the flanges **45**.

Urschel does not teach friction stir welding. Colligan teaches a method of joining workpieces by friction stir welding using a rotating friction stir welding tool having a probe on a tip end thereof, when the abutting regions are friction stir welded, said probe is plunged into the outer circumferential surface and thereafter moved in a joining direction along the abutment

between the end faces to scan said abutting regions (column 3, lines 48-59). It would have been obvious to include the friction stir welding of Colligan in the process of Urschel at the time of the invention because friction stir welding creates a strong, good quality weld.

Regarding claim 9, Urschel teaches said first end face and said second end face are present on the same metal workpiece, and said abutting regions are provided by curving said metal workpiece to bring said first end face and said second end face into abutment against each other (figure 7).

Regarding claim 34, Colligan teaches that each of the first and second end faces comprise a finger, which forms protrusions along a joining direction of said first and second end faces when said first and second end faces are brought into said abutment (figure 3). It would have been obvious to one of ordinary skill in the art at the time of the invention to include the protrusions of Colligan in the method of Urschel because this allows the imperfections at the beginning and the end of the weld to be removed from the product (column 8, lines 19-27).

7. Claim 36 is rejected under 35 U.S.C. 103(a) as being unpatentable over US 2,148,714 Urschel in view of US 5,794,835 Colligan et al as applied to claim 8 above and further in view of US 2,740,877 Knauth et al.

Regarding claim 36, Colligan teaches the fingers extending from corner portions, abutting respective fingers thereby forming protrusions at opposite ends of the abutting regions (figure 3). Urschel teaches bending the metal workpiece. Neither Colligan nor Urschel teaches a gripping mechanism. Knauth teaches a method of welding pipes and metallic sheets together including gripping said edges by a gripping mechanism such that the edges are maintained in abutment along said joining direction. It would have been obvious to one of ordinary skill in the

art at the time of the invention to include the grippers of Knauth in the method of Colligan because the gripping fingers ensure that the workpieces remain stationary and aligned during welding. Additionally, it would have been obvious to grip the protrusions of Colligan with the grippers because this would minimize interference with the weld tool during the welding process.

8. Claims 5, 6, 7 and 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 5,794,835 Colligan et al in view of US 2,148,714 Urschel and further in view of US 6,325,273 Boon et al.

Regarding claim 5, Colligan teaches a friction stir welding process with a rotating friction stir welding tool having a probe **18** with a substantially circular cross section on a tip end thereof, wherein said first end is present on a retreating side relative to a rotating direction of said probe and said second end is present on an advancing side relative to the rotating direction of said probe (figure 5C), and said probe is plunged, wherein a rotational axis of said probe extends substantially parallel to a plane between said first and second end faces where said faces are brought into abutment with each other (figure 7).

Colligan does not teach the two ends on the same workpiece. Urschel teaches a method of welding two metal sheets or two ends of a single metal sheet to form a tube including joining first and second ends of a metal workpiece together comprising bringing a first end face and a second end face respectively on the first and second ends of the metal workpiece into abutment against each other, and thereafter joining said first end face and said second end face to each other along a boundary line where the end faces abut (figure 7). It would have been obvious to one of ordinary skill in the art to include the bending step and single workpiece of Urschel in the method of Colligan because bending a metal sheet to form a tube is a common method of

creating tubes and pipes, and having only one workpiece minimizes the potential weak portions of the product.

Colligan does not teach the displacement of the tool. Boon teaches a friction stir welding tool in which a probe **11** (figure 4) is plunged with a central region thereof being displaced from said boundary line to said second end by a predetermined distance within a range equal to or smaller than the radius of the probe, wherein a minimum value of displacement of said probe in said range is greater than 0 (figure 1), where the plunging member can be needle-shaped instead of the crescent-shaped probe shown in the figures (column 8 lines 28-45) or protrusion **2** of probe **1** may be considered to be displaced from the boundary line. Boon does not teach the exact displacement amount. However, it would have been obvious to one of ordinary skill in the art at the time of the invention to determine the optimum degree displacement for the probe because a larger displacement creates a wider weld. "[W]here the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation," (MPEP 2144.05 Section II). It would have been additionally obvious to one of ordinary skill in the art to include the probes and the displacement of Boon in the method of Colligan because this creates a wider weld with a larger penetration area (column 5, lines 45-47).

Regarding claim 6, Boon teaches that said probe is displaced from said boundary line to said second end by a distance equal to or smaller than one half of the radius of the probe (figure 3), where one of the protrusions **2** of probe **1** will always be displaced by a distance equal to or smaller than one-half the radius of the probe (figure 3). It would have been obvious to one of ordinary skill in the art to include the probes and the displacement of Boon in the method of

Colligan because this creates a wider weld with a larger penetration area (Boon column 5, lines 45-47).

Regarding claim 7, Urschel teaches a workpiece having said first end face and a workpiece having said second end face on the same workpiece (figure 7).

Regarding claim 33, Colligan teaches that each of the first and second end faces comprise a finger, which forms protrusions along a joining direction of said first and second end faces when said first and second end faces are brought into said abutment (figure 3).

Response to Arguments

9. Applicant's arguments filed October 29, 2009, have been fully considered but they are not persuasive.

Applicant argues that Boon's probe is not substantially circular in cross section. However, the probe **1** of Boon includes two (or more) protrusions **2**. These protrusions together create the probe. Therefore, the probe itself, including all of the protrusions, has an elliptical, or substantially circular, cross section.

Applicant argues that Boon is forming a lap joint and therefore cannot read on the claim. However, it is not the method of Boon that the Examiner is importing into the method of Colligan or Urschel; it is the tool, specifically the probe configuration.

Applicant argues that Boon does not teach that the probe is perpendicular to the workpiece surface. However, Colligan teaches this in figure 7.

Applicant argues that Boon does not teach end faces of a workpiece disposed in abutment with each other. However, this is taught by Urschel and Colligan. The Examiner appreciates that the intention of the invention is to form butt welds. However, please note that "end faces"

includes upper and lower surfaces as they are the end faces in the vertical direction. With this interpretation, Boon does meet the abutting end faces limitation. The Examiner recommends amending this to exclude the upper and lower surfaces as end faces.

Applicant argues that Boon does not teach the probe displacement. However, as explained above, one of the protrusions **2** of probe **1** will always be displaced by a distance equal to or smaller than one-half the radius of the probe. Thus, it would have been obvious to one of ordinary skill in the art to include the probes and the displacement of Boon in the method of Colligan because this creates a wider weld with a larger penetration area (Boon column 5, lines 45-47).

Applicant argues that Knauth's gripping mechanism would be contrary to the claimed invention and Colligan's method. However, the Examiner reiterates that Knauth's method may be used for seam welding pipes (column 6, lines 14-18). Knauth's apparatus is capable of, and used for, seam welding pipes, as the instant invention claims. Knauth is not welding two cylinders arranged side by side.

Applicant argues that Knauth's apparatus grips edges and not protrusions. However, the Examiner is importing only the gripping mechanism of Knauth into the method of Colligan. Therefore, as Knauth's grippers are capable of gripping protrusions, Colligan in view of Knauth would result in the grippers securing the protrusions.

Applicant argues that the Examiner is misinterpreting claim 2. However, as explained above, the Examiner is not misinterpreting the claim, and Colligan in view of Urschel and Knauth teaches that the body is pressed from the outside as the cylinder must be held in some way during the welding operation to ensure that it is positioned correctly.

Applicant argues that Cleveland teaches a varied profile of the tubular body. However, this arrangement is not excluded by the claim.

Conclusion

10. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MEGHA MEHTA whose telephone number is (571)270-3598. The examiner can normally be reached on Monday to Friday 7:30 am to 5:00 pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jessica Ward can be reached on 571-272-1223. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Megha Mehta/
Examiner, Art Unit 1793

/Kiley Stoner/
Primary Examiner, Art Unit 1793